

Executive Summary



EXECUTIVE SUMMARY

Executive Summary

“Today, there is no economy but the global economy, no Internet but the global Internet, and no network but the global network. Global Crossing and 360networks will battle for worldwide supremacy, but in a trillion-dollar market, there will be no loser.”
—George Gilder, *Forbes*, Feb. 19, 2001

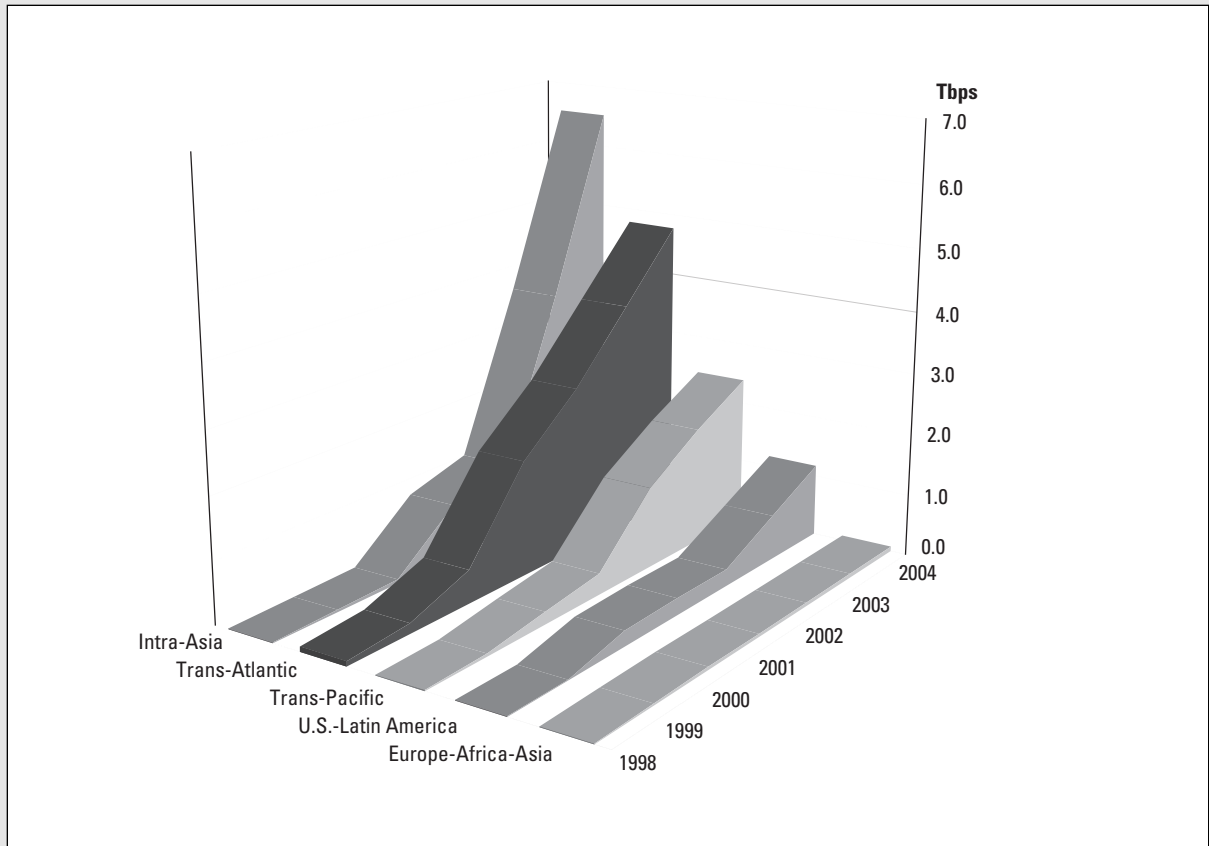
After five years of frenzied network construction, the fiber-optic industry is suffering a hangover so severe that it’s hard to remember why anyone ever thought it was a good idea to lay an undersea cable in the first place. While the pain will likely persist for some time to come, TeleGeography’s analysis of bandwidth demand suggests that the underlying idea may not have been so far off the mark.

This inaugural edition of *Submarine Bandwidth* builds on TeleGeography’s previous research on undersea bandwidth supply and demand, initiated in the *International Bandwidth* series. The report can serve as a stand-alone analysis of the undersea cable industry or as a companion to TeleGeography’s forthcoming *Terrestrial Bandwidth 2002* report. *Submarine Bandwidth 2002* quantifies present and future capacity supply and demand; offers a primer on bandwidth products, contracts, and technology; reviews data on cable construction, upgrade, and maintenance costs; and presents detailed pricing data for circuits and wavelengths. The second half of *Submarine Bandwidth* presents detailed, two-page profiles of 68 undersea cable networks.

Supply

The past five years have seen an extraordinary increase in undersea cable capacity. A confluence of factors drove the unprecedented boom. The liberalization of telecom markets around the world combined with the rapid growth of the Internet to greatly increase demand for undersea capacity. New entrepreneurial developers of undersea cables, such as Global Crossing, were quick to respond to this demand. Their initial success, in turn, prompted a wave of new cable construction. The Internet-fueled stock market bubble of the late 1990s enabled cable builders to raise funds, effectively lowering once-daunting barriers to entry. Finally, breakthrough advances in fiber-optic technology, such as dense wave division multiplexing (DWDM) dramatically increased the potential capacity of new cables.

Figure 1. Submarine Cable Capacity Trends by Route, 1998-2004



Notes: Capacity figures denote lit, protected capacity at the end of the respective year. Projected capacity assumes U.S.-Europe cables will reach half of their fully upgradeable capacities by 2005 while cables on other routes will reach half of their fully upgradeable capacities by 2007. Projections for 360atlantic assume no capacity upgrades. Bandwidth for systems with redundant capacity used for protection (e.g., self-healing rings) includes protected capacity totals only.

Source: TeleGeography research

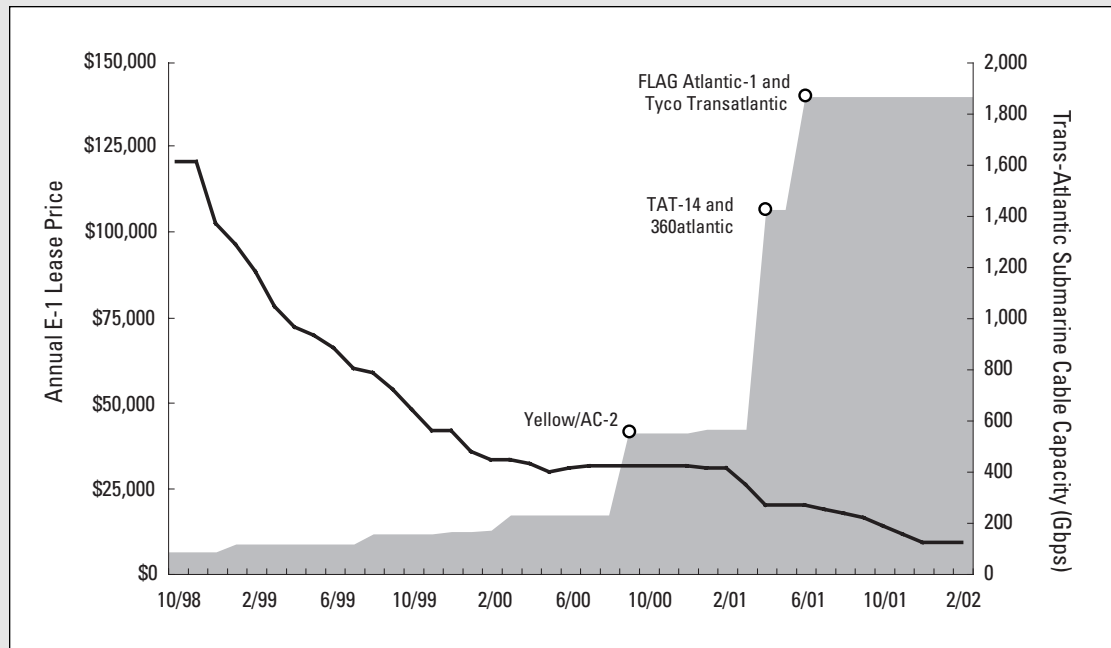
© TeleGeography, Inc 2002

The result has been a stunning increase in undersea fiber-optic cable capacity (see Figure 1. Submarine Cable Capacity Trends by Route, 1998-2004). Since 1998, lit capacity on both trans-Atlantic and trans-Pacific cables has grown more than 20-fold while lit capacity on intra-Asian regional cables has increased more than 50-fold in only four years. Although construction of new cables has slowed sharply, two high-capacity cables are still scheduled to be deployed this year, one each in the Atlantic and Pacific.

Capacity Prices

The tremendous influx of new capacity has had an equally dramatic impact on bandwidth prices—they have dropped at a breathtaking pace. On competitive routes (and few routes can now be considered non-competitive), prices have fallen by 50 percent or more in each of the past three years (see Figure 2. New York-London E-1 Lease Prices and Trans-Atlantic Capacity, 1998-2001).

Figure 2. New York-London E-1 Lease Prices and Trans-Atlantic Capacity, 1998-2001



Source: TeleGeography research

© TeleGeography, Inc 2002

Substantially reduced unit costs have also driven the decline in bandwidth prices. TeleGeography's analysis of network construction costs suggests that, on a dollars per Mbps basis, the unit cost of new-generation cables built in 2001 were often 90 percent lower than cables laid only three years earlier.

Nevertheless, on many routes, financial distress has prompted carriers to offer capacity at prices well below their own underlying costs. There are growing indications that bandwidth prices are stabilizing on some routes, albeit at dauntingly low levels. Whether prices remain stable or will resume their downward spiral, may ultimately be determined by 360networks and Global Crossing's creditors. If the companies were to emerge from bankruptcy with forgiven debts, prices could be dictated by the companies' marginal costs of operating the networks and by the costs of future network upgrades, without regard to the debt payments that increase their peers' cost structures.

Demand

Through 2000, bandwidth providers, when questioned about falling capacity prices, inevitably pointed to demand models that predicted a huge upsurge in growth. Accelerating capacity purchases would more than match the effect of any price decreases, proponents of these companies argued. The collapse of bandwidth stocks has eroded confidence in such optimistic projections. Some observers have recently questioned whether demand is even growing at all.

EXECUTIVE SUMMARY

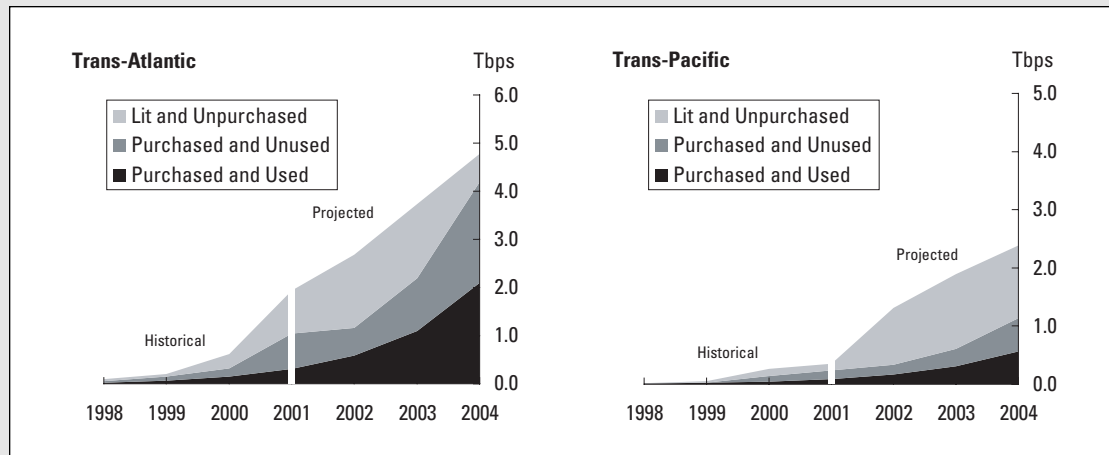
TeleGeography's research suggests that, although far less spectacular than once assumed, bandwidth demand growth remains robust. According to estimates based on reported capacity sales, the amount of purchased, transoceanic submarine bandwidth increased 196 percent in 2000 and 212 percent in 2001. However, contract values from these sales have fallen as capacity prices have spiraled downward. Furthermore, these bandwidth growth rates may overstate recent demand. Submarine cable providers do not report capacity sales until a cable is lit and circuits (or wavelengths) are actually delivered to customers. A significant portion of bandwidth sales reported in 2001 actually were derived from pre-sale contracts negotiated in 1999 and 2000. This reporting lag serves to disguise actual purchasing trends and may obscure a general slowdown in bandwidth demand.

TeleGeography's research documents a number of factors driving bandwidth purchases:

- Internet network provisioning has driven the majority of capacity purchases. International Internet bandwidth roughly quadrupled in both 1998 and 1999 and tripled from 2000 to 2001.
- Internet buildout appears poised for a slowdown. Increases in Internet access bandwidth to homes and businesses—a key factor driving international buildout—have decelerated from triple-digit to double-digit annual growth.
- Incumbent carriers—former and/or current national telecom monopolies—accounted for nearly half of all sales on private, entrepreneurial cables. This finding, somewhat surprising given that many of these incumbents already own capacity on consortium cables, stems from incumbent buildout of bandwidth-hungry, global IP networks.
- Purchase patterns have shifted in recent years from small to large circuits. Between 1999 and 2001, international ISPs purchased and deployed just 300 new STM-4, STM-16, and STM-64 circuits, yet these new circuits accounted for *80 percent* of total international Internet bandwidth. Volume-based discounts on large circuits have stimulated growth as measured in gigabits deployed but have eroded bandwidth provider sales revenues.

Although expansion has begun to slow, capacity purchases and deployments continue at a significant pace. Figure 3 (Lit, Purchased, and Used Bandwidth: Future Projections) presents one scenario for future bandwidth supply, purchases, and deployments. A literal read of these projections suggests there will be a coming bandwidth scarcity on trans-Atlantic routes and a severe capacity overhang in the trans-Pacific region. However, the level of future supply is not a fixed, immutable quantity. Providers have built the ability to implement incremental upgrades into new cables, giving them the flexibility to tailor future supply increases to suit demand conditions. If the demand scenario presented in Figure 3 plays out, it seems likely that providers will install trans-Atlantic capacity more quickly and trans-Pacific supply less quickly than shown here. Combined with continued double-digit annual demand growth, the supply-side subtleties offered by DWDM upgrade technology eventually will assist providers in achieving equilibrium.

Figure 3. Lit, Purchased, and Used Bandwidth: Future Projections



Lit capacity assumptions: Cables upgrade according to the upgrade schedules announced by cable owners. Trans-Atlantic cables without announced upgrade schedules increase to 50 percent full capacity by 2005. 360atlantic is not upgraded. Trans-Pacific cables without announced upgrade schedules increase to 50 percent full capacity by 2007. Bandwidth for systems with redundant capacity used for protection (e.g., self-healing rings) includes protected capacity totals only.

Purchased capacity assumptions: Bandwidth purchased by carriers and ISPs increases at a 2:1 margin over capacity actively deployed in their networks. For methodology in estimating historical purchased capacity, please see Figure 2 on page 103.

Used capacity assumptions: Bandwidth deployments in voice networks continue to grow at historical pace. Bandwidth growth in Internet networks immediately slows to 100 percent per year beginning 2002. Non-Internet, private network growth gradually slows to 0 percent per year by 2006. This is the "slow" growth scenario presented in Figure 5 on page 108.

Source: TeleGeography research

© TeleGeography, Inc 2002

The Road Ahead

Unfortunately, the elusive state of market equilibrium will not arrive soon enough for some companies. Caught between falling prices, slowing demand, and difficult debt covenants, a number of bandwidth providers showed signs in early 2002 that they may join scores of other telecom companies in bankruptcy. Even so, supply costs are falling, demand continues to grow, and prices will eventually stabilize. Once the current market chaos finally does subside, investors will likely perceive what no one wanted to admit in the 1990s: when stripped of its "new economy" glamour, the bandwidth industry fundamentally is a competitive one. As with most companies in competitive industries, the surviving bandwidth suppliers will likely earn a respectable—if unspectacular—return on their capital investments. 🎯

EXECUTIVE SUMMARY